

WHAT IS CLAIMED IS:

1 1. A method of generating a dynamic image mask comprising:
2 scanning an image to produce a digital original image comprised of a plurality
3 of pixels corresponding to a spatial location in the image, wherein each pixel includes
4 an original value corresponding to a characteristic of the image; and
5 calculating a dynamic image mask value for each pixel by averaging the
6 original value of a pixel with only the original values of the pixels proximate that
7 pixel having original values lower than a threshold sharpness.

1 2. The method of Claim 1, wherein scanning an image comprises
2 scanning a film image

1 3. The method of Claim 1, wherein scanning an image comprises
2 scanning a photographic print.

1 4. The method of Claim 1, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to a color.

1 5. The method of Claim 1, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to luminance.

1 6. The method of Claim 1, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to range of
3 frequencies.

1 7. The method of Claim 1, wherein averaging the original value of a pixel
2 with only the original values of the pixels proximate that pixel having original values
3 less than a sharpness threshold comprises averaging the original value of a pixel with

PATENT APPLICATION

4 only the weighted original values of the pixels proximate that pixel having original
5 values less than a sharpness threshold.

1 8. The method of Claim 7, wherein the weighted original values are
2 determined according to the following formula:
3

$$4 \quad w_N = \left(1 - \frac{|pixelN - centerpixel|}{Gain} \right),$$

5 wherein pixelN is the value of the pixel being weighed, centerpixel is the
6 value of a central pixel, and wherein Gain is the threshold sharpness.
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PATENT APPLICATION

1 13. A method of generating an image mask comprising:
2 scanning an image to produce a digital original image;
3 generating a decimated representation of the original image;
4 applying a blurring algorithm to form a blurred representation of the decimated
5 representation, wherein the blurred representation includes a plurality of pixels having
6 varying values to form sharp edges representative of rapidly changing boundaries in
7 the decimated image and less sharp regions corresponding to regions of less rapidly
8 changing values in the decimated image; and
9 combining the blurred representation with the decimated representation.

1 14. The method of Claim 13, wherein the combination of the blurred
2 representation with the decimated representation is used to generate an image mask.

1 15. The method of Claim 13, wherein a plurality of decimated images are
2 generated to form sequential levels in a pyramidal decomposition formation, and a
3 sequential level is formed by decimating the image of the current level.

1 16. The method of Claim 13, wherein image detail is arranged over an area
2 having a particular radius, and the blurring algorithm is capable of blurring detail
3 found in the original image over a radius proportional to the particular radius in which
4 the image detail is arranged.

1 17. The method of Claim 13, wherein the blurring algorithm is performed
2 on decimated representations of a plurality of levels of the pyramidal decomposition
3 formation, prior to forming the image of the next level.

1 18. The method of Claim 13, wherein the value of a pixel in the blurred
2 representation is dependent upon a contrast between a corresponding pixel in the
3 decimated image and pixels proximate to the corresponding pixel.

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1 19. The method of Claim 13, wherein the value of a pixel in the blurred
2 representation is dependent upon a rate of change in contrast between a corresponding
3 pixel in the decimated image and pixels proximate to the corresponding pixel.

1 20. The method of Claim 13, wherein the blurring algorithm includes
2 averaging the value of a central pixel corresponding to the pixels in the blurred
3 representation with weighted values of a plurality of neighboring pixels.

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PATENT APPLICATION

1 21. A method for enhancing a scanned image comprising:
2 scanning an image to produce a digital original image comprised of a plurality
3 of pixels corresponding to a spatial location in the image, wherein each pixel includes
4 an original value corresponding to a characteristic of the image;
5 calculating a dynamic image mask value for each pixel by averaging the
6 original value of a pixel with the original values of the pixels proximate that pixel
7 having original values lower than a threshold sharpness; and
8 applying the dynamic image mask value to the original value for each
9 corresponding pixel using a mathematical function to produce an enhanced scanned
10 image.

1 22. The method of Claim 21, wherein scanning an image comprises
2 scanning a transparency based image.

1 23. The method of Claim 21, wherein scanning an image comprises
2 scanning a reflective based image.

1 24. The method of Claim 21, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to a color.

1 25. The method of Claim 21, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to range of
3 frequencies.

1 26. The method of Claim 21, wherein averaging the original value of a
2 pixel with only the original values of the pixels proximate that pixel having original
3 values less than a sharpness threshold comprises averaging the original value of a
4 pixel with only the weighted original values of the pixels proximate that pixel having
5 original values less than a sharpness threshold.

1 27. The method of Claim 26, wherein the weighted original values are
2 determined according to the following formula:

3

$$4 \quad w_N = \left(1 - \left| \frac{pixelN - centerpixel}{Gain} \right| \right),$$

5 wherein pixelN is the value of the pixel being weighed, centerpixel is the
6 value of a central pixel, and wherein Gain is the threshold sharpness.

1 28. The method of Claim 21, wherein the original values used to calculate
2 the difference less than the sharpness threshold correspond to different characteristics
3 than the original values used in averaging.

1 29. The method of Claim 21, wherein calculating a dynamic image mask
2 value includes performing a pyramidal decomposition on the original image.

1 30. The method of Claim 21, wherein the mathematical function comprises
2 division.

1 31. The method of Claim 21, wherein the mathematical function
2 comprises:

3

$$OUT = \frac{IN}{\frac{3}{4} MASK + \frac{1}{4}},$$

4 wherein OUT is the value of the pixel being calculated in the enhanced
5 scanned image, IN is the value of the relative pixel in the original image, and MASK
6 is the value of the relative pixel in the dynamic image mask.

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1 32. The method of Claim 21, further comprising performing histogram
2 leveling to the enhanced scanned image.

1 33. The method of Claim 21, wherein the enhanced scanned image
2 includes an image contrast and a grayscale contrast.

1 34. The method of Claim 33, wherein the image contrast and the grayscale
2 contrast can be controlled independently of each other.

1 35. The method of Claim 21, wherein the dynamic image mask value may
2 be proportionally varied by a user.

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1 36. A scanner system comprising:
2 a light source operable to illuminate an image disposed within a media;
3 a sensor system operable to measure the illumination from the image and
4 produce electronic signals;
5 a processor operable to receive the electronic signals and produce image
6 values for each pixel; and
7 a memory media having software stored thereon, wherein the software is
8 operable to:
9 calculate a dynamic image mask value for each pixel by averaging the
10 image value of a pixel with the image values of the pixels proximate that pixel
11 having image values lower than a threshold sharpness; and
12 apply the dynamic image mask value to the image value for each
13 corresponding pixel using a mathematical function to produce an enhanced
14 scanned image.

1 37. The scanner system of Claim 36, wherein the sensor system operates to
2 measure the illumination transmitted through the image.

1 38. The scanner system of Claim 36, wherein the sensor system operates to
2 measure the illumination reflected from the image.

1 39. The scanner system of Claim 36, further comprising a printer operable
2 to print the enhanced scanned image.

1 40. The scanner system of Claim 39, wherein the printer comprises a
2 photographic printer.

1 41. The scanner system of Claim 39, wherein the printer comprises an ink
2 type printer.